

The Examiner objected to claim 16 under 37 CFR 1.75 as being of improper dependent form for failing to further limit the subject matter of a previous claim. As noted above, claim 16 has been cancelled.

The Examiner rejected claims 3 and 18 under 35 U.S.C. §112, first paragraph, because the Examiner could not find support in the specification for a second region of a second conductivity type that encircles a well of the second conductivity type.

Claim 1, which has been amended to include limitations from claim 3, recites, in part,

"a second region of the second conductivity type formed in the well, the second region having a top surface, and being formed so that the top surface of the second region encircles the top surface of the well that encircles the top surface of each first region, the second region having a dopant concentration that is greater than the dopant concentration of the well."

Claim 18 has been amended to recite similar limitations.

The "second region" required by claims 3 and 18 can be read to be n⁺ region 816 shown in FIGs. 8 and 9 of applicant's specification. N⁺ region 816 is formed in well 812, and has the same conductivity type as well 812.

In addition, as shown in applicant's FIG. 8, the top surface of n⁺ region 816 encircles the top surface of each region labeled N⁻ cathode. As shown in applicant's FIG. 9, each region labeled N⁻ cathode is a surface region of n-well 812. Further, each n-well region labeled N⁻ cathode encircles the p⁺ regions 814 which, in turn, can be read to be the plurality of first regions.

As a result, the top surface of the second region (n+ region 816) encircles the top surface of the well (N- cathode labeled region) that encircles the top surface of each first region (p+ region 814). Thus, amended claim 1 (claim 3) and amended claim 18 are believed to satisfy the requirements of the first paragraph of section 112.

The Examiner rejected claims 9, 11, and 21 under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. As noted above, claim 9 has been cancelled.

With respect to claims 11 and 21, the Examiner argued that it is impossible for a third region to be formed in a first region, and yet to encircle the first region.

Claim 11 recites, in part,

"a third region of the second conductivity type, the third region having a top surface, and being formed in the first region so that the top surface of the third region encircles the top surface of the first region that encircles the top surface of each second region, the third region having a dopant concentration that is greater than the dopant concentration of the well."

Claim 21 recites similar limitations.

The "third region" required by claims 11 and 21 can be read to be n+ region 816 shown in FIGs. 10 and 11 of applicant's specification. N+ region 816 is formed in NLDD region 1010 (which can be read to be the first region of the claims), and has the same conductivity type as NLDD region 1010.

In addition, as shown in applicant's FIG. 10, the top surface of n+ region 816 encircles the top surface of each NLDD region 1010. Further, the top surface of each NLDD region 1010 (the first region) encircles the top surfaces of p+ regions 814 (which can be read to be the second regions).

As a result, claims 11 and 21 are believed to satisfy the requirements of the second paragraph of section 112.

The Examiner rejected claims 1, 5, and 12-14 under 35 U.S.C. §103(a) as being unpatentable over Gens et al. (U.S. Patent No. 5,515,225). The Examiner also rejected claims 2-3 and 10-11 under 35 U.S.C. §103(a) as being unpatentable over Gens et al. in view of Rao (U.S. Patent No. 5,770,886).

The Examiner further rejected claims 6, 9, 15-16, 19, and 22-23 under 35 U.S.C. §103(a) as being unpatentable over Gens et al. in view of the admitted prior art. The Examiner additionally rejected claims 17-18 and 20-21 under 35 U.S.C. §103(a) as being unpatentable over Gens et al. in view of the admitted prior art and Rao. For the reasons set forth below, applicant respectfully traverses these rejections.

Claim 1 has been amended to include limitations from claims 2 and 3 and recites, in part,

"a second region of the second conductivity type formed in the well, the second region having a top surface, and being formed so that the top surface of the second region encircles the top surface of the well that encircles the top surface of each first region, the second region having a dopant concentration that is greater than the dopant concentration of the well."

In rejecting claim 3, the Examiner pointed to n+ region 42 of Rao as constituting the second region of the claims.

Applicant, however, has been unable to find any discussion in Rao that teaches or suggests that the top surface of n+ region 42 shown in FIG. 2 of Rao encircles the top surface of well 26 that encircles the surface of each p+ region. As a result, amended claim 1 and dependent claim 5 are patentable over Gens in view of Rao. (Claims 12-14 were cancelled in the amendment filed on April 13, 2000.)

With respect to claim 6, which depends from amended claim 1, applicant has been unable to find any discussion within the Gens reference or applicant's admitted prior art that teaches or suggests the second region as required by amended claim 1. As a result, claim 6 is patentable over Gens in view of applicant's admitted prior art.

With respect to claim 10, this claim requires:

"a well of a second conductivity type formed in the substrate, the well having a surface and a dopant concentration; and

"a first region of the second conductivity type formed in the well, the first region having a surface, and a dopant concentration that is less than the dopant concentration of the well; [and]

"a plurality of spaced-apart second regions of the first conductivity type, each second region having a surface, the plurality of second regions being electrically connected together, and formed in the first region so that the surface of the first region encircles the surface of each second region." [Brackets added.]

In rejecting the claims, the Examiner pointed to well 26 shown in FIG. 2 of Rao as constituting the well of claim 10, p+ regions 34-37 as constituting

the first region of claim 10, and n+ regions 39-42 as constituting the second regions of claim 10. Claim 10, however, requires the well and the first region to have the same conductivity type. As a result, p+ regions 34-37 can not be read to be the first regions of claim 10.

Further, if an n+ region of n+ regions 39-42 is read to be the first region, then p+ regions 34-37 can not be read to be the second regions as claim 10 requires the second regions to be formed in the first region. As shown in FIG. 2 of Rao, none of the p+ regions 34-37 are formed in the n+ regions 39-42. As a result, amended claim 10 is patentable over Gens in view of Rao.

With respect to claim 11, this claim has been amended and recites, in part,

"the third region . . . being formed in the first region so that the top surface of the third region encircles the top surface of the first region that encircles the top surface of each second region."

In rejecting claim 11, the Examiner pointed to buried layer 108 as constituting the third region of the claims. As shown in FIG. 9 of Rao, however, buried layer 108 is not formed in a first region (the p+ or n+ regions shown in FIG. 2 of Rao), and does not have a top surface that encircles the top surface of the first region (the p+ or n+ regions of FIG. 2 of Rao). As a result, claim 11 is patentable over Gens in view of Rao for this additional reason.

With respect to claim 15, this claim has been amended to recite, in part,

"a plurality of ESD positive lines, the plurality of positive lines not being connected to a steady voltage source."

In rejecting the claims, the Examiner, citing page 12, lines 8-13 of applicant's specification, pointed to applicant's FIG. 5 as teaching a plurality of ESD positive lines. With respect to the cited section of applicant's specification (page 12, lines 8-13), this section states that mixed signal chips usually have multiple, isolated VCC lines.

As noted above, however, amended claim 15 recites that the positive lines are not connected to a steady voltage source (such as VCC). As a result, the admitted prior art of applicant's specification does not teach that mixed signal chips usually have multiple positive lines.

With respect to FIG. 5 of applicant's specification, this figure shows a number of output drivers driver#1-driver#N that are each connected to a steady voltage source (VCC) and a shared dirty ground wire. Thus, applicant's FIG. 5 does not show the multiple positive lines required by amended claim 15. As a result, claim 15 and dependent claims 19 and 22-23 are patentable over Gens in view of applicant's admitted prior art.

With respect to claims 17-18 and 20-21, applicant has been unable to find any discussion in the Rao reference that teaches or suggests the use of multiple positive lines as required by independent claim 15. As a result, claims 17-18 and 20-21 are patentable over Gens in view of applicant's admitted prior art and the Rao reference.

With respect to claim 18, this claim, like amended claim 1, also recites a second region. As noted above in the discussion of claim 1, the Rao

reference does not teach or suggest the second region of claim 1. As a result, claim 18 is patentable over Gens in view of applicant's admitted prior art and the Rao reference for this additional reason.

With respect to claim 20, this claim, like amended claim 10, also recites a first region. As noted above in the discussion of claim 10, the Rao reference does not teach or suggest the first region of claim 10. As a result, claim 20 is patentable over Gens in view of applicant's admitted prior art and the Rao reference for this further reason.

With respect to claim 21, this claim, like amended claim 11, also recites a third region. As noted above in the discussion of claim 11, the Rao reference does not teach or suggest the third region of claim 11. As a result, claim 21 is patentable over Gens in view of applicant's admitted prior art and the Rao reference for this reason as well.

With respect to new claims 32-36, these claims either directly or indirectly depend from amended claim 1. As a result, these claims are patentable over Gens in view of Rao for the same reasons that amended claim 1 is patentable.

Further, applicant notes that since new claims 32-36 directly or indirectly depend from amended claim 1, it is impossible for new claims 32-36 to be directed to an independent and distinct invention. As a result, new claims 32-36 are not subject to restriction.

Thus, for the foregoing reasons, it is submitted that all of the claims are now in a condition for allowance. Therefore, the Examiner's early re-examination and reconsideration are respectively requested.

Respectfully submitted,
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Dated: 8-15-00

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Atty Docket No. NSC1-D8400 [PO3921]